GA1.13:RCED-89-38

United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on Regulation and Business Opportunities, Committee on Small Business, House of Representatives

COMPLETED
54

January 1989

WATER POLLUTION

More EPA Action Needed to Improve the Quality of Heavily Polluted Waters

About Our New Cover...

The new color of our report covers represents the latest step in GAO's efforts to improve the presentation of our reports.

GAO

United States
General Accounting Office
Washington, D.C. 20548

Resources, Community, and
Economic Development Division

B-232918

January 6, 1989

The Honorable Ron Wyden
Chairman, Subcommittee on Regulation
and Business Opportunities
Committee on Small Business
House of Representatives

Dear Mr. Chairman:

This report presents the results of our review on how the Environmental Protection Agency's (EPA) Seattle Regional Office and the four states within that region are implementing the Clean Water Act's requirements to clean up rivers not meeting water quality standards. We also reviewed the actions EPA and Oregon have taken to set stricter water pollution limits on Oregon's Tualatin and South Umpqua Rivers, both of which do not meet water quality standards.

As arranged with your office, unless you publicly release its contents earlier, we will make this report available to other interested parties 30 days after the date of this letter. At that time, we will send copies to other appropriate congressional committees; the Administrator, EPA; the Director, Office of Management and Budget; and other interested parties upon request.

This work was performed under the direction of Hugh J. Wessinger, Senior Associate Director. Other major contributors are listed in appendix III.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Billions of federal, state, local, and private dollars have been spent on treatment plants and other facilities to restore and maintain the quality of the nation's waters. While progress has been made, some waters are so polluted that normal levels of treatment provided by these plants are not enough to bring these waters into compliance with state water quality standards.

To obtain an indication of how well the Environmental Protection Agency (EPA) is ensuring that these heavily polluted waters are cleaned up, the Chairman, Subcommittee on Regulation and Business Opportunities, House Committee on Small Business, requested that GAO review the actions taken by EPA's Region X and the states within the region—Oregon, Washington, Idaho, and Alaska. Specifically, the Chairman asked GAO to determine how well EPA's Region X has implemented the Clean Water Act's requirements to clean up rivers that are still unable to meet state water quality standards, even after the construction of treatment plants. GAO also agreed to determine what actions EPA and Oregon have taken to set stricter pollution limits on the Tualatin and South Umpqua Rivers in Oregon, both of which do not meet state water quality standards.

Background

The Congress has enacted a series of laws to ensure that the nation's waters are cleaned up and can be used for designated purposes such as swimming, fishing, and water supply. The Federal Water Pollution Control Act Amendments of 1972, known as the Clean Water Act, set the stage for EPA and the states to focus on technology-based controls (based on the results achieved by actual industry practices in limiting the amount of pollutants in their effluent) to limit pollutants discharged into bodies of water. Under this approach, cities, towns, and factories are required to build and maintain wastewater treatment plants that meet national standards for pollutant discharges.

When these treatment requirements are not sufficient to clean up a river, stream, or smaller water segment, the act requires use of a water-quality-based approach. Under this approach, the states identify such waters and designate them as "water quality limited." If so designated, the states are to establish more stringent pollution limits called "total maximum daily loads" (the greatest amount of a pollutant the water body can receive daily without violating a state's water quality standard), and to take whatever additional cleanup actions are necessary. Such actions might include advanced levels of wastewater treatment

and/or controls over storm water discharges and agricultural land runoff. EPA is required to approve or disapprove the maximum loads set by the states. If it disapproves, EPA must develop maximum loads for the states' water quality limited segments.

Results in Brief

Although considerable sewage treatment plant construction has been completed and technology-based standards have been implemented in the states of Region X, 602 segments of rivers and streams are water-quality-limited. For most of these segments, the states in Region X have yet to fully implement the more stringent requirements of the act—the setting of total maximum daily loads—that would enable their water-quality-limited segments to achieve state water quality standards through additional controls.

GAO sought to determine whether this situation existed elsewhere by contacting EPA officials in three other regions. While more has been done by some of the states in these regions than the states in Region X, GAO found that total maximum daily loads have not been implemented on most water-quality-limited segments. EPA did not define basic program concepts, such as a definition of total maximum loads, until 1985. EPA officials told GAO that they had considered this effort to be a low priority prior to 1985.

A more current problem concerns the priority attached by states to these requirements. Officials in three Region X states told GAO that no deadline exists for setting maximum loads, and therefore they plan to emphasize other water pollution control programs for which deadlines do exist. Another problem is that EPA headquarters does not have management controls that identify which bodies of water are water-quality-limited and the status of maximum load development and implementation on such bodies of water. Consequently, EPA does not know whether the states are fulfilling the act's requirements and has no way of fulfilling its responsibilities to take actions when the states do not do so.

Oregon, as a result of a consent decree, has developed or begun to develop maximum loads for pollutants on the Tualatin River, the South Umpqua River, and nine other bodies of water.

Principal Findings

More Stringent Controls Not Set on Heavily Polluted Waters

Many states and EPA have not developed total maximum loads for many of the nation's most polluted waters. Information available at and discussions with officials of EPA Region X showed that maximum loads have been set for 1 of the 602 water-quality-limited segments. Maximum loads are now being developed or planned for 41 of the remaining 601 water-quality-limited segments. Similarly, maximum loads have been set for only 4 of EPA's New York Region's 168 segments. More maximum loads have been set in the other two regions GAO contacted: 43 percent have been set for EPA's San Francisco Region's 77 segments, and 31 percent were set for EPA's Chicago Region's 227 segments during fiscal year 1987. Consequently, 16 years since the Clean Water Act was enacted, many water segments do not meet state standards.

Three factors have contributed to this situation. First, EPA officials told GAO that prior to 1985, setting maximum loads was a low priority relative to funding and controlling wastewater treatment plants. Second, EPA did not issue regulations defining maximum loads until 1985, following a court decision ruling that EPA was not fulfilling its responsibilities to approve or disapprove maximum loads set by the states.

Third, EPA management controls do not track development and implementation of maximum loads on individual water segments or their effectiveness in meeting state water quality standards. EPA plans to collect information on water-quality-limited segments and on the total number of segments for which maximum loads are being developed. However, this information will not identify which segments have had maximum loads developed and which segments have not.

Effect of New Law on Maximum Load-Setting

The Water Quality Act of 1987 added new requirements to control nonpoint sources of pollutants (diffused sources such as runoff from farmland) and to accelerate actions to control toxic point sources under certain circumstances. Officials from EPA Region X states, with the exception of Oregon, said they do not plan to set any maximum loads on water-quality-limited segments beyond their existing plans (one maximum load is being developed in Washington) because they prefer to use funds on hand to implement the 1987 water quality requirements for which legislative deadlines exist.

GAO acknowledges the difficulties imposed on EPA and states by budget limitations and the additional requirements imposed by the Water Qual-

ity Act of 1987. However, the Clean Water Act's maximum load requirements provide a comprehensive approach to resolving water pollution problems regardless of the sources of pollution. In addition, setting maximum loads can be useful in identifying more effective and cost-efficient cleanup alternatives—an attribute made all the more important in view of the limited funding cited by EPA and these states. For example, in the case of the Dillon Reservoir (near Denver, Colo.), EPA funded a study using maximum load-setting to identify alternatives that are expected to provide more cleanup for less cost. Therefore, delaying implementation of maximum load-setting, based on budget limitations, carries with it a cost of its own.

Tualatin and South Umpqua Rivers

Oregon, as a result of a consent decree, has initiated action to develop maximum loads on 11 bodies of water. On September 22, 1988, Oregon established maximum loads for 1 of the 11 bodies of water and for one pollutant (ammonia) for the Tualatin River. Oregon plans to set the maximum load on the remaining Tualatin River pollutant (phosphorus) by the end of the year. Maximum loads for the South Umpqua River and eight other bodies of water should be set by June 1993, as required by the consent degree.

Recommendations

GAO recognizes that states and EPA must set priorities when faced with limited budgets and increased water pollution control responsibilities. GAO makes a number of recommendations that can improve the maximum load-setting process while recognizing these constraints. Among GAO's recommendations are that the Administrator, EPA

- work with the states to set time frames, recognizing the priorities imposed by the Water Quality Act of 1987 requirements and budget resources, for developing total maximum daily loads on their water-quality-limited segments and
- establish management controls that will help the agency track compliance with the requirements that (1) maximum daily loads are developed and (2) corresponding pollution control measures are implemented on heavily polluted waters.

Agency Comments

GAO discussed the contents of the report with EPA and Region X state officials, who generally agreed with the facts presented, and has included their comments where appropriate. However, as agreed, GAO did not obtain official comments on a draft of this report.

Contents

Executive Summary		2
Chapter 1 Introduction		8
	Evolution of Water Pollution Strategies	9
	Objectives, Scope, and Methodology	18
Chapter 2 More Stringent Controls Not Implemented on Most Heavily Polluted Waters		20
	EPA Region X States Have Just Begun to Set TMDLs	20
	TMDLs Not Set for Many Waters in Other EPA Regions	23
	Reasons Why TMDL Requirements Have Not Been Fully Implemented	24
	EPA Has No Way of Assessing TMDL Implementation Nationwide	27
	Need to Better Integrate TMDL-Setting With New Water Quality Legislation	30
	Cost Savings Expected From Setting a TMDL on One Body of Water	32
	Conclusions	34
	Recommendations to the Administrator, EPA	36
Appendixes		
	Appendix I: Oregon's Development of TMDLs on the Tualatin River	38
	Appendix II: Oregon's Development of TMDLs on the South Umpqua River	45
	Appendix III: Major Contributors to This Report	51
Table		
	Table 2.1: Key Events in the TMDL Process for EPA and Oregon	26
Figures		
	Figure 1.1: Water-Quality-Based and Technology-Based Approaches to Controlling Pollution	10
	Figure 1.2: Status of River Miles Assessed for Attainment of Water Quality Standards	12
	Figure 1.3: Sources of Pollution in Waters Assessed as Impaired	13
	Figure 1.4: Basic Steps in the Water Quality Approach	15
	Figure I.1: Location of Tualatin River	39
	Figure II.1: Location of South Umpqua River	46

Abbreviations

EPA	Environmental Protection Agency
GAO	General Accounting Office
TMDL	total maximum daily load

Introduction

Nationally, a number of rivers, streams, lakes, estuaries, underground aquifers, and wetlands have been polluted in modern times by the disposal of human and industrial wastes. Each day, billions of gallons of polluted wastewater are generated from homes and industries across the country. In addition, waters are polluted by runoff from urban areas and from farming, forestry, mining, and construction activities. Left untreated, this contaminated waste enters the nation's waterways and may kill fish and other aquatic life and leave the water unfit for human use.

Water pollution comes from two major origins—point sources and nonpoint sources. Point sources are those which discharge pollutants from such specific points as outfall pipes of sewage treatment plants and factories. Nonpoint sources, on the other hand, cannot be located with such precision. Runoff from city streets, construction sites, and farms and mines are examples. Toxic and nontoxic pollutants have entered the nation's waters from both sources.

Pollution of the nation's lakes, rivers, and streams has led the Congress to enact a series of laws to control some sources of such pollution. These laws have led to extensive efforts by federal and state agencies and industry to reduce the amount of pollutants discharged from point sources into our waters. Also, legislation in 1987 created a new program to address and control nonpoint source pollution.

The Environmental Protection Agency (EPA) is the key federal agency responsible for administering federal water pollution control efforts. In addition, each state is required to set water quality standards for every significant body of surface water within its borders. Water quality standards represent the goals which pollution controls are meant to secure. EPA requires that to set these standards, the states specify the uses of each body of water (such as drinking water or commercial fishing) and determine the maximum pollution levels that can be tolerated without impairing those uses.

States (or EPA) have set effluent limitations defining the amount and kinds of pollutants that may be discharged by point sources into waterways and they have issued permits to parties making such discharges, including municipal sewage plants and industries operating their own wastewater treatment facilities.

These antipollution procedures are supported by an enforcement program conducted by EPA and state environmental agencies to ensure that

cities and industries meet the requirements set out in their discharge permits.

The major part of EPA's water quality effort has been directed at developing and enforcing technology-based standards for pollutant discharges and financially assisting in building treatment plants to control pollutants that are discharged by municipalities. For example, under EPA's construction grants program, from 1972 to 1988 about 7,000 construction projects have been completed, with EPA providing $48 billion of the more than $65 billion invested in grant-assisted wastewater treatment plants.

This report examines an aspect of the water pollution effort that has received less emphasis: state and federal efforts to clean up water segments that remain polluted even after technology-based national standard point source treatment requirements have been fully implemented.

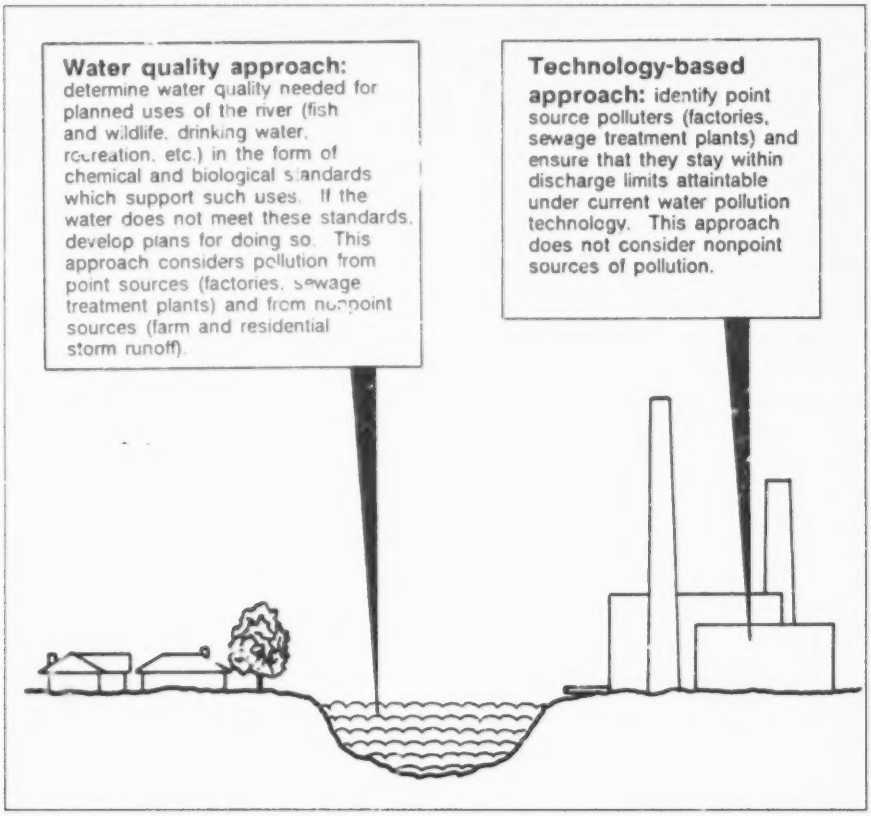
Evolution of Water Pollution Strategies

Past legislation has taken two basic approaches to cleaning up the nation's polluted waters.

- The water quality approach. This approach emphasizes the overall quality of individual bodies of water. Under this approach, for example, a state might set a standard based on a particular use set for a water segment that requires that the concentration of phosphorus in a lake should be no more than 0.025 milligrams per liter. If overall water quality meets this and other such standards, no additional limitations are needed on what is being discharged into the water by individual point and nonpoint sources. If water quality does not meet all such standards, an overall plan is needed to control the amount of excessive pollutants being discharged.
- The technology-based approach. This approach emphasizes ensuring that all individual, identifiable polluters stay within discharge (or effluent) limits attainable under current water pollution treatment technology whether they discharge into clean or polluted waters. For example, well-designed and well-operated secondary sewage treatment plants, in coordination with primary treatment, are able to remove up to 90 percent of sewage pollutants. A technology-based approach would concentrate on ensuring that all point sources discharging sewage have systems in place to meet the standard. This approach deals only with pollution from point sources, because technology-based standards have only been established for point source dischargers.

Figure 1.1 illustrates how the water-quality-based and technology-based approaches address pollution problems.

Figure 1.1: Water-Quality-Based and Technology-Based Approaches to Controlling Pollution



Prior to 1972, the states and EPA used a water quality approach. In general, the states developed water quality standards specifying required levels of cleanliness for lakes, rivers, and streams. If water quality standards in a particular body of water were being violated, individual dischargers could be required to reduce their pollutant discharges.

The water-quality-based approach proved difficult to put into effect. Scientific data on which to base decisions about specific pollution control levels were often not available. Not having good technical data made it hard to decide how much pollution each discharger along a stream segment could release. An EPA official said that not having enforceable discharge permit limits was also a major factor. The pre-

1972 water-quality-based approach relied on enforcing water quality standards. This was hard to do because it was difficult to prove that a specific discharger caused water quality standards to be violated. In addition, many sewage treatment plants had not yet been built, and EPA and the states had a strong desire to start controlling water pollution rather than just studying the problem. As a result, the Congress required all dischargers to be permitted and added a technology-based approach for water pollution control in 1972.

1972 Clean Water Act: A Technology-Based Approach

The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251, et seq.), known as the Clean Water Act, added a technology-based approach. The act focused federal efforts on requiring thousands of municipal and industrial point dischargers to meet minimum technology-based standards before discharging wastes into the nation's rivers, streams, and lakes. Under the act, EPA established national standards for effluent discharge from municipal sewage treatment plants and industrial facilities on the basis of the average of well-designed and well-operated treatment plants during the late 1960s and early 1970s. Each industrial and municipal discharger had to obtain a permit for its wastewater discharges. This permit, among other things, set discharge limits on pollutants with which the discharger must comply, regardless of how clean or polluted the receiving waters were.

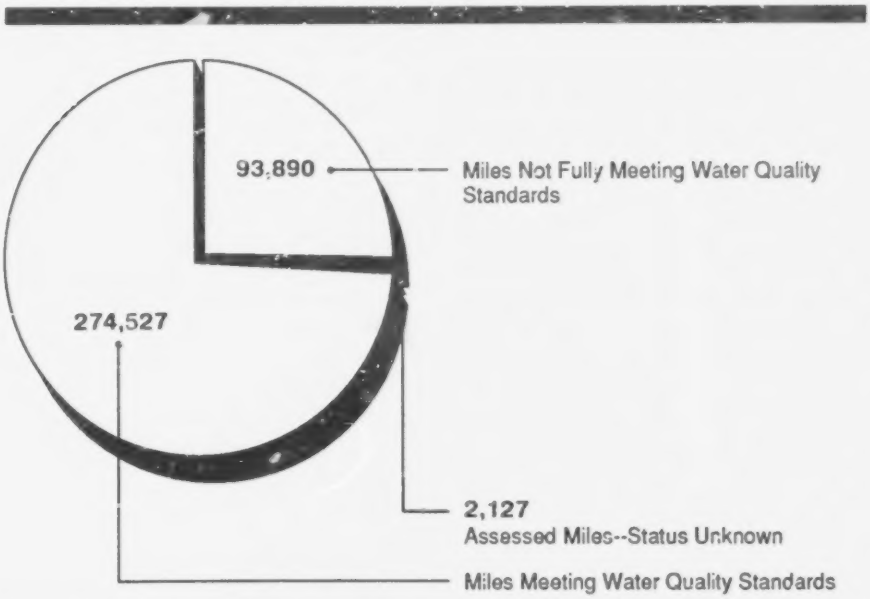
EPA has reported that progress made in controlling water pollution under the technology-based approach since 1972 has been considerable. The EPA Administrator stated in 1987 that the nation's commitment to improve water quality has had significant results. According to the Administrator, about three-quarters of the waters assessed are clean enough for fishing and swimming, and substantial strides have been made toward improving pollution-control efforts at all levels of government. In a prior report,[1] we also found strong evidence of reductions in the discharge of conventional water pollutants from point sources.

Despite these gains, some waters are still not suitable for swimming or fishing. EPA's 1986 National Water Quality Inventory, a biennial report on overall water quality, states that persistent pollution problems remain. For example, out of 370,544 river miles that were assessed (21 percent of the nation's estimated 1.8 million miles of rivers), 93,890 miles (25 percent) did not fully meet water quality standards. Figure 1.2

[1]The Nation's Water: Key Unanswered Questions About the Quality of Rivers and Streams (GAO/PEMD-86-6, Sept. 19, 1986).

shows the status of the nation's river miles assessed for attainment of water quality standards.

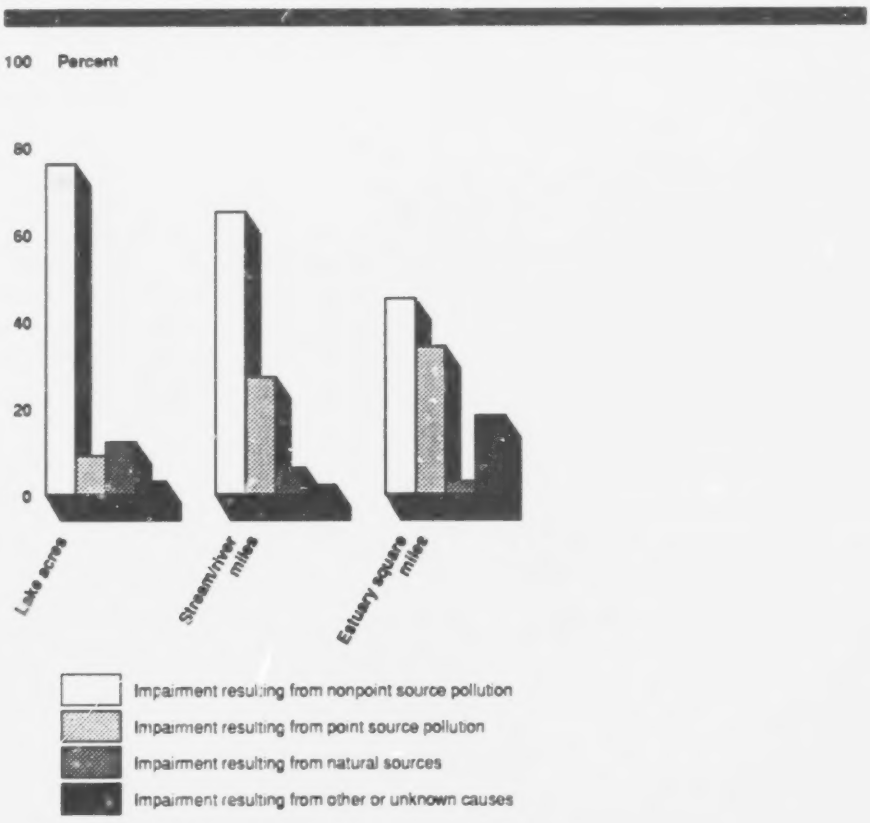
Figure 1.2: Status of River Miles Assessed for Attainment of Water Quality Standards



Amounts are based on assessment of 370,544 river miles reported in EPA's National Water Quality Inventory 1986 Report to Congress. This amount is about 21 percent of the nation's total river miles.

EPA's 1986 National Water Quality Inventory also notes that the states reported that nonpoint sources are the leading current cause of failure to support uses in the nation's lakes, streams, and estuaries. According to EPA's report, 76 percent of impaired lake acres, 65 percent of impaired stream miles, and 45 percent of impaired estuary square miles are affected by nonpoint sources. Even though point sources also continue to contribute to pollution, nonpoint sources appear to be increasingly important causes of the remaining pollution, according to the report. Figure 1.3 identifies, for bodies of water assessed nationwide, the sources of pollution which are impairing these water bodies.

Figure 1.3: Sources of Pollution in Waters Assessed as Impaired



Percentages are based on waters assessed nationwide and reported by EPA in 1986.

Water-Quality-Based Approach for Heavily Polluted Waters

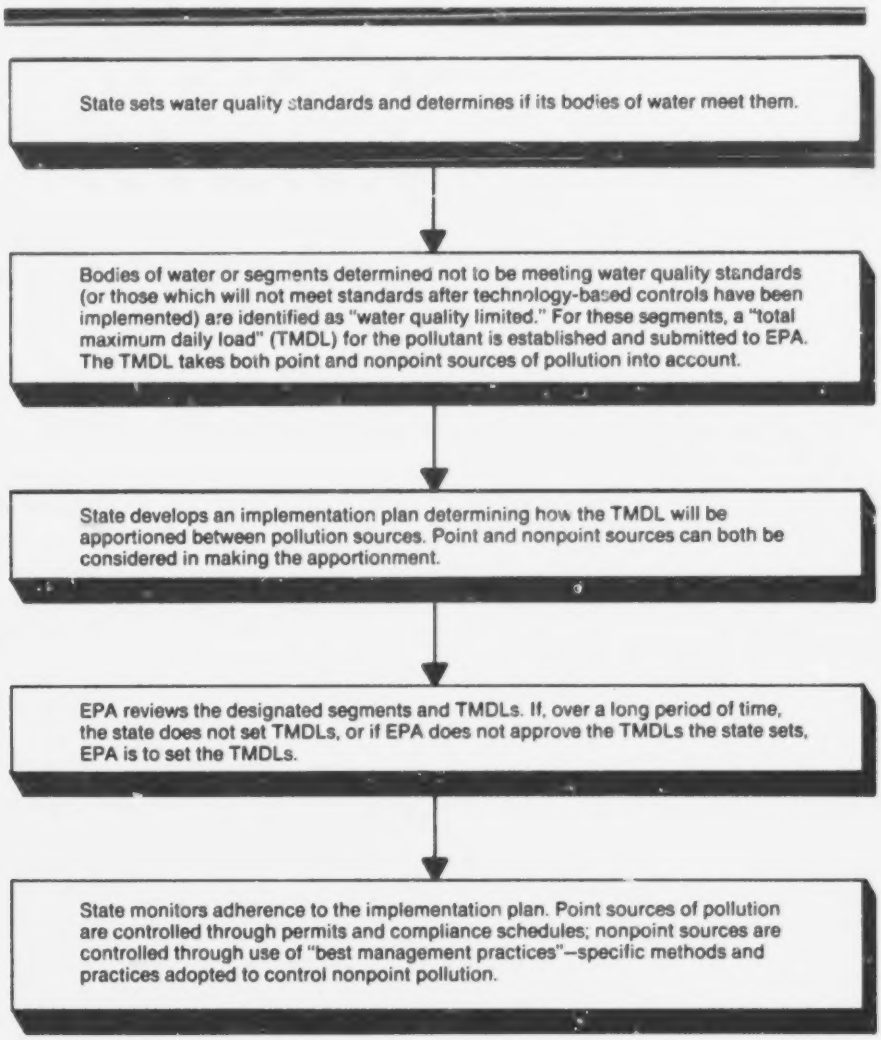
The 1972 act recognized that the minimum technology-based standards on pollutants that can be discharged from point sources would not always allow receiving waters to meet water quality standards, and required an additional cleanup approach for these waters. Section 303(d) of the act requires that

- ". . . each State shall identify those waters within its boundaries for which the effluent limitations . . . are not stringent enough to implement any water quality standard applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters."
- ". . . each State shall establish for the waters identified . . . the total maximum daily load, for those pollutants which the Administrator (of

EPA) identifies . . . as suitable for such calculation. Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality."

To implement section 303(d) of the act, states need to identify the quality of each body of water and compare it with its water quality standards. If the body of water does not or will not meet the state water quality standards, even after the technology-based standards have been implemented, the water body is designated as "water quality limited." EPA Region X officials stated that this designation can be given to an entire body of water or to a segment, such as a 3-mile stretch of a river. Figure 1.4 lists the basic steps taken in the 303(d) water quality approach to cleaning up polluted waters.

Figure 1.4: Basic Steps in the Water Quality Approach



For those segments or bodies of water designated as water-quality-limited, this section of the act requires the state to establish a "total maximum daily load," or TMDL, which is the greatest amount of a pollutant that the water body can receive each day without violating water quality standards. The state is required to submit a list of these water-quality-limited segments, ranked by priority, and their TMDLs to EPA for approval. EPA must either approve or disapprove the listing. If disapproved, EPA must prepare a list of the state's water-quality-limited segments and develop TMDLs on those segments. Under these provisions, all

water-quality-limited segments throughout the nation must have a TMDL set for each pollutant or pollutants that cause the segments to fall short of attaining their designated uses.

The act requires the states to submit to EPA the waters identified and the TMDLs established from time to time, with the first submission 180 days after EPA identifies pollutants suitable for TMDLs. EPA guidance allows the states to submit the waters identified and the TMDLs as part of the states' annual work plan or with its biennial report on water quality, required under other sections of the Clean Water Act. EPA did not identify pollutants suitable for TMDLs until December 1978; therefore, the states should have identified their first water-quality-limited segments and established TMDLs by June 1979.

In its 1985 regulations on establishing a TMDL, EPA called for taking both point and nonpoint sources into account. EPA's regulations establish two components for the TMDL.

- A "waste load allocation," which is the portion of a TMDL that is allocated to point sources of pollution.
- A "load allocation," which is the portion allocated to nonpoint sources of pollution and to natural background sources of pollution.

Implementation of TMDLs may be accomplished by putting additional controls on nonpoint and/or point sources of pollution. EPA guidance notes that the TMDL process provides for tradeoffs between point and nonpoint pollutant loadings. The guidance states that if best management practices[2] or other nonpoint source pollution controls make more stringent load allocations practicable, wasteload allocations for point source pollution can be made less stringent.

The following example of the TMDL process was provided by the Director of EPA's Office of Water Regulations and Standards in testimony before House subcommittees in May 1988.

"Consider a small river feeding into a lake with a phosphorus problem. The State water quality standards have established a phosphorus criterion of 0.1 milligrams per liter to help prevent eutrophication in the lake. To avoid exceeding this limit, the State calculates that no more than 500 pounds of phosphorus can be discharged to the river per day given the volume of stream flow available in the river. This 500 pound limit is the TMDL. Based on an analysis of point and nonpoint sources on the

[2]Best management practices are methods, measures, or practices selected by an agency to control nonpoint sources of pollution.

river, and considering dilution and local flow characteristics at the site, the State decides that two cities located on the river should discharge no more than 250 pounds and 100 pounds of phosphorus per day, respectively, from their sewage treatment plants, leaving 150 pounds of runoff for nearby agricultural areas, expected population growth, and, very importantly, an adequate margin of safety. These figures, 250 and 100 pounds per day, constitute the wasteload allocation for the river. They then form the basis for deriving enforceable limitations in the NPDES [National Pollutant Discharge Elimination System] discharge permits that the State issues to the two cities' sewage treatment plants, and they are adopted in the water quality management plan for the river to help guide decisions on nonpoint source controls, and on future growth."

1987 Clean Water Act Amendments Augment the Water Quality Approach

In the Water Quality Act of 1987, the Congress reaffirmed the goals of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. It also stressed the need for comprehensive programs for water pollution control. The Congress added new programs that required the control of nonpoint sources of pollutants and accelerated action to control toxic point sources under certain circumstances. These initiatives are similar to the section 303(d) requirements of the Clean Water Act, which the Water Quality Act of 1987 retained. The following are the new provisions:

- Section 308 of the Water Quality Act created a new section 304(l) that deals with controls over toxic pollutants from point sources. The amendment requires that by February 4, 1989, states will identify waters that are impaired or threatened by both point and nonpoint sources of pollution. Section 304 also requires states to identify and list waters that do not or are not expected to meet water quality standards even after technology-based controls have been implemented due entirely or substantially to point source discharges of toxic pollutants. For each body of water on the latter list, states must then identify the point sources responsible for toxic pollution and propose individual control strategies (i.e., discharge permits and supporting documentation) for reducing toxic discharges from these facilities.
- Section 316 of the Water Quality Act adds a new section 319 that deals with controls over nonpoint sources. It required states to identify by August 4, 1988, waters which, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to meet water quality standards and develop programs for reducing this pollution.

EPA officials indicate that they are taking action to implement these amendments. In testimony before two subcommittees of the House Committee on Merchant Marine and Fisheries on May 25, 1988, the Director of EPA's Office of Water Regulations and Standards said,

"We are now placing great emphasis on generating lists of specific waterways which do not meet water quality standards or objectives. We are also working with States to ensure they adopt appropriate criteria for toxic pollutants in accordance with the 1987 amendments."

Objectives, Scope, and Methodology

In a letter dated July 29, 1987, the Chairman, Subcommittee on Regulation and Business Opportunities, House Committee on Small Business, expressed concern that the billions of dollars spent on water pollution regulation and sewage treatment have not achieved the Clean Water Act's goals of fishable, swimmable waters and that adoption of stringent new pollution regulations may seriously hamper economic growth among businesses of all sizes. We subsequently agreed with the Chairman's office to address this issue by determining what EPA's Seattle Regional Office (Region X) has done to implement the Clean Water Act's requirements to clean up rivers not meeting water quality standards. We also agreed to provide information on the (1) actions EPA's Seattle Regional Office and Oregon have taken to set stricter pollution limits on Oregon's Tualatin and South Umpqua Rivers, both of which do not meet water quality standards and (2) amount of federal funds that have been spent on the sewage treatment plants and dams constructed on these rivers. Information on the Tualatin and South Umpqua rivers is contained in the case studies in appendixes I and II, respectively.

To meet the first objective, we obtained data from EPA headquarters and Region X officials on their policies and procedures for implementing the requirements of section 303(d) of the Clean Water Act. During our review, the Seattle region was the lead EPA region for water quality programs. We interviewed EPA headquarters and Region X officials and state officials in each of the four states under the jurisdiction of Region X—Washington, Oregon, Idaho, and Alaska—on the status of the agency's compliance with section 303(d) requirements. To better understand the applicability of Region X's experience to other parts of the country, we also contacted three other EPA Regions (Region II, in New York; Region V, in Chicago; and Region IX, in San Francisco) to determine the extent to which these regions implemented section 303(d) requirements. We also obtained information about the Dillon Reservoir

in Colorado, cited by EPA officials as a good example of TMDL setting, which used both point and nonpoint source controls.

To meet the second objective, we interviewed EPA, state, and local officials and reviewed Region X records on the status of actions taken to set more stringent controls on the Tualatin and South Umpqua Rivers in Oregon. We also met with state and local groups to identify concerns with the setting and implementation of more stringent controls on these rivers. Officials we met with included those from the Oregon Department of Environmental Quality, the Unified Sewerage Agency of Washington County, the Washington County Board of Commissioners, the Northwest Environmental Defense Center, the Roseburg Urban Sanitary Authority, the Umpqua Regional Council of Governments, and the Douglas County Branch of the Oregon Department of Water Resources. We also attended meetings of citizens and technical advisory groups which advised the Department of Environmental Quality on actions that should be taken to control water pollution. In addition, we attended public hearings on controls proposed by the state of Oregon for the Tualatin River. Copies of the testimony offered by the public and by representatives of environmental and other interest groups, as well as the opinions of the state and federal agencies involved in this process, were collected.

Our work was conducted from October 1987 through May 1988, with updates through October 1988, and was performed in accordance with generally accepted government auditing standards. The views of EPA, state, and local officials responsible for the programs discussed in this report were sought during our review. In general, they agreed with the facts presented, and we have incorporated their comments where appropriate. In accordance with the wishes of the Chairman's office, we did not solicit official comments from EPA or the other agencies included in our review.

More Stringent Controls Not Implemented on Most Heavily Polluted Waters

The four states in EPA's Region X have identified bodies of water (primarily creek and river segments) that do not meet state water quality standards, even though almost all of the major treatment facilities have been built to the basic treatment standards required by the Clean Water Act. As noted in chapter 1, Section 303(d) of the Clean Water Act requires additional cleanup efforts to be identified in such situations. TMDLs, the greatest amount of a pollutant that a body of water can receive without violating water quality standards, are required to be set for these bodies of water so that the water quality standards may be achieved through additional controls.

Our review of these states indicates that few TMDLs have been set for such waters and that, as a result, their quality may continue to be substandard. Furthermore, most of the TMDLs that are being developed in the region are in Oregon—which only began setting TMDLs in response to a lawsuit filed in December 1986. Our contacts with three other EPA regions disclosed similar results in complying with the Section 303(d) requirement, indicating that the problem exists elsewhere in the country as well.

Among the major factors contributing to this situation are that (1) TMDL requirements have generally received relatively low priority from EPA and the states and (2) EPA has no management system to track the development and implementation of TMDLs, thus complicating any effort to identify and resolve TMDL-setting problems. Officials from Washington, Idaho, and Alaska told us that in the future, they plan to use their limited resources to emphasize compliance with new requirements under the Water Quality Act of 1987. As a result, with the exception of one river in Washington, they have no plans to set new TMDLs on any other water-quality-limited bodies of water. Oregon plans to continue its efforts to set TMDLs.

EPA Region X States Have Just Begun to Set TMDLs

EPA Region X and its states of Oregon, Washington, Idaho, and Alaska have not yet set maximum loadings for 601 of their 602 water-quality-limited segments. As of October 7, 1988, Oregon has set TMDLs for one water-quality-limited segment and for one of two pollutants on another water-quality-limited segment. TMDLs are being developed or planned for 41 water-quality-limited segments in Region X.

The chief of EPA Region X's Construction Grants Branch stated that as of September 13, 1988, the states of Oregon, Idaho, and Alaska have completed construction of all but a few of the municipal sewage treatment

facilities required by the Clean Water Act. Washington has built 54 percent of its major municipal facilities, and all but 5 of the remaining facilities are on compliance schedules that set firm timetables for completing construction of treatment facilities.

Oregon Initiated TMDL Action Because of a Lawsuit

As of July 1988, the state of Oregon had identified 73 water-quality-limited segments out of 226 water body segments assessed. However, until forced by a December 1986 lawsuit, Oregon did not initiate actions to set total maximum daily loads on its water-quality-limited segments. The lawsuit, filed by the Northwest Environmental Defense Center against EPA, cited Oregon's and EPA's failure to set total maximum daily loads for Oregon's water-quality-limited segments. As a result of a consent decree, the Oregon Department of Environmental Quality (the agency responsible for implementing Oregon's pollution control program's rules and standards) initiated action to develop TMDLs on 11 water-quality-limited segments. The Tualatin River TMDL process is the prototype for developing TMDLs on the other water-quality-limited segments.

Oregon has set the maximum load for 1 of the 11 water-quality-limited segments (Garrison Lake) and for 1 of 2 pollutants on another water-quality-limited segment (Tualatin River). On September 22, 1988, Oregon's Department of Environmental Quality submitted TMDLs and waste load and load allocations for ammonia on the Tualatin River and for phosphorus on Garrison Lake to EPA Region X. Region X approved the submission on October 7, 1988. Oregon officials said they intend to submit the Tualatin River's phosphorus TMDL and waste load and load allocations to Region X by the end of the year.

TMDL development on the South Umpqua River is being delayed until TMDLs are set for other priority segments, and the Oregon Department of Environmental Quality has resources to work on the South Umpqua. The state's schedule is to develop TMDLs on the water-quality-limited segments named in the consent decree, including the South Umpqua River, by 1993. (See Apps. I and II for descriptions of the process and TMDL status on the Tualatin and South Umpqua Rivers, respectively.)

According to the Oregon Department of Environmental Quality Water Quality Planning Section Manager, the Department will develop TMDLs for 40 of the remaining 72 water-quality-limited segments. These 40 segments include the Tualatin River (its phosphorus TMDL) and the other bodies of water named in the consent decree. The Department does not

plan to develop TMDLs on the other 32 water-quality-limited segments because of the technical difficulties in establishing the nonpoint source loadings. However, according to this official, the Department plans to develop areawide control strategies that will reduce the loadings from nonpoint sources. An EPA regional office official said that this approach seems reasonable and that EPA will work with the state in the future to overcome the technical difficulties in establishing nonpoint loadings.

Little TMDL Action Taken in Other EPA Region X States

Of the other three EPA Region X states, only Washington has taken action to develop a TMDL on a water-quality-limited segment. The Washington Department of Ecology (the agency responsible for implementing Washington's pollution control programs) has developed a preliminary phosphorus TMDL on the Spokane River. Washington water quality officials stated that although a Spokane River TMDL has been calculated, the state is still working with the affected polluters to establish their final limits and does not plan to implement the TMDL until January 1989. Washington's Department of Ecology has determined that out of 374 water body segments assessed, 173 (46 percent) either in total or in part are water- quality-limited. These segments are not fully supporting designated uses because of such pollution problems as industrial and municipal sewage, agriculture, and urban runoff. According to the Water Quality Program Manager, Washington Department of Ecology, no action has been taken or is planned to develop TMDLs on water-quality-limited segments in Washington other than the Spokane River. This official told us that Washington has other program priorities on which they will focus their efforts, such as completion of the 1987 Water Quality Act requirements.

Although Idaho has recently submitted a list of its water-quality-limited segments to Region X, no TMDLs have been developed. In its May 1988 draft report on water quality status and nonpoint source assessment, Idaho identified that out of 241 water segments assessed, 172 (71 percent) are water-quality-limited. These segments are not fully supporting the beneficial uses because of pollution from such sources as agriculture, mining, construction, forest practices, and hydrologic/habitat modification. According to the Chief, Water Quality Bureau, Idaho Division of Environmental Quality (the agency responsible for implementing Idaho's pollution control program), as of June 1988, Idaho was not developing TMDL controls on any of these water segments because they plan to fund other priorities, such as completion of the 1987 Water Quality Act initiatives.

Alaska reported 184 (33 percent) out of 561 bodies of water as being water-quality-limited in a June 1988 draft report it sent to Region X.[1] Although its substandard waters have now been tentatively identified, the Deputy Director, Alaska Department of Environmental Conservation (the agency responsible for implementing Alaska's pollution control programs), said the Department will not devote resources to calculating total maximum daily loads for a number of reasons. First, he believes there are few streams in Alaska that have more than a single discharger. Consequently, there is no need to calculate TMDLs to allocate loadings among the various dischargers. Second, the Department does not have the resources to devote to setting TMDLs because other program priorities are using up all of its resources. He said that to develop all the TMDLs would take at least 3 years, during which time other water pollution programs would cease.

EPA Region X Has Not Developed TMDLs

EPA Region X has not set TMDLs in the states which have not developed TMDLs for water-quality-limited segments. EPA's duty to prescribe TMDLs where states fail to do so was recognized in a 1984 case in which the Seventh Circuit Court of Appeals held that if any state fails to establish TMDLs, EPA must consider whether the state has made a constructive decision not to establish a TMDL. If EPA determines that the state's failure to submit TMDLs is a constructive submission, it must approve or disapprove that decision. If EPA disapproves, then it must identify water-quality-limited segments and establish TMDLs. However, as of August 1, 1988, the Deputy Regional Administrator said that Region X had no plans to establish any TMDLs because it did not have the staff resources to develop them for the states' water-quality-limited segments. According to the Deputy Regional Administrator, developing TMDLs for the four states would be an overwhelming task, and the region is expending its resources on higher EPA priorities, such as working on sections 304(l) and 319 created by the 1987 Water Quality Act.

TMDLs Not Set for Many Waters in Other EPA Regions

To obtain an indication of whether other EPA regions are experiencing the same problems that we identified in Region X, we contacted three other EPA regions to determine the extent to which TMDLs have been developed in these regions for water-quality-limited waters. While some of these regions reported that more TMDLs had been set than in EPA's Region X, TMDLs have not been set for many water-quality-limited segments in these regions.

[1]An Alaska state official reported that this list was about 95-percent complete.

The Waste Load Allocation/TMDL Coordinator for EPA's Region IX stated that as of June 1988, Region IX's 4 states and 3 trust territories had identified 77 water-quality-limited segments and developed 33 TMDLs (43 percent). Region V's Waste Load Allocation/TMDL Coordinator stated that within Region V's 6 states, during fiscal year 1987, 70 waste load allocation/TMDLs were developed on the states' 227 water-quality-limited segments (31 percent). The Chief of the Water Planning and Standards Branch in Region II identified, within its 4 states/territories, 168 water-quality-limited segments. However, he said only four TMDLs have been developed on these segments.

Reasons Why TMDL Requirements Have Not Been Fully Implemented

We discussed the reasons for the limited implementation of section 303(d) with EPA headquarters and Region X officials and officials in the states of Oregon, Washington, Idaho, and Alaska. In general, they told us that they have emphasized the technology-based controls of the act and have focused on other sections of the act or water quality programs that have congressionally mandated time frames. In addition, EPA headquarters' officials stated that setting TMDLs can be very difficult in situations where multiple sources (point and nonpoint) and/or pollutants impair water quality.

TMDL Requirements Have Received a Low Priority

EPA Region X and headquarters officials generally acknowledge that TMDL requirements were a low priority prior to 1985. They stated that the key emphasis for several years has been funding municipal sewage treatment plants and establishing discharge limits for municipal and industrial treatment plants.

More recently, the Congress has placed a priority on implementing controls on the dischargers of toxic substances under section 304(l) and controlling nonpoint pollution under section 319. According to EPA officials, these efforts have mandated time frames which cause EPA to give them a higher emphasis than TMDL requirements.

EPA Action on TMDLs Was Compelled by Lawsuits

EPA actions to implement the TMDL requirements of the act have largely been compelled though lawsuits. The 1972 Clean Water Act required EPA to develop and publish a list of pollutants suitable for maximum daily load measurements on waters not meeting water quality standards by October 18, 1973. EPA did not take action until 5 years later, when EPA was compelled by court order to publish an identification of pollutants

(Board of County Comrs. v. Costle, No. 78-0572 (D.D.C. 1978) (unpublished order)). On December 28, 1978, EPA determined that all pollutants, under the proper technical conditions, are suitable for the calculation of TMDLs.

In the 1984 case mentioned earlier, the court disagreed with EPA's position that it has no responsibility under the Clean Water Act unless or until a state submits a TMDL on a water-quality-limited segment. The court ruled that if a state fails over a long period of time to submit proposed TMDLs, this prolonged failure may amount to the "constructive submission" by the state of no TMDLs. The court reasoned that, although the Clean Water Act does not explicitly require EPA to set TMDLs in the absence of state action, ". . . the states' inaction here, in view of the short statutory deadline, may have ripened into a refusal to act. A refusal to act would amount to a determination that no TMDL is necessary and none should be provided." A state determination to set no TMDLs must be reviewed by EPA, and EPA is then required to approve or disapprove the submission. If EPA disapproves, it must set its own TMDLs (Scott v. City of Hammond, 741 F.2d 992 (7th Cir. 1984)).

After this decision, EPA issued regulations in January 1985 that defined a TMDL. Guidance provided in October 1985 described the roles and responsibilities of the states and EPA regions in designating water-quality-limited segments and developing TMDLs. The chronology in table 2.1 lists the key events related to EPA actions regarding section 303(d) and the status related to the TMDL process for the state of Oregon.

Table 2.1: Key Events in the TMDL Process for EPA and Oregon

Date	Event
Oct. 18, 1972	Clean Water Act required EPA by October 18, 1973, to develop and publish a list of pollutants suitable for maximum daily load measurements.
June 6, 1973	Oregon classified all its rivers as "water quality limited."
July 17, 1973	EPA agreed with Oregon's stream classifications.
Apr. 16, 1974	Clean Water Act required that within 180 days of publication of the list of pollutants, states identify "water quality limited" segments and set TMDLs to ensure that water quality standards are met.
Dec. 28, 1978	EPA, compelled by lawsuit (Board of County Comrs. v. Costle) identified the pollutants suitable for maximum daily load measurements. EPA determined that all pollutants, under the proper technical conditions, are suitable for the calculation of TMDLs.
June 26, 1979	Clean Water Act's 180-day deadline passed for development of TMDLs; Oregon did not meet this deadline.
Jan. 11, 1985	EPA provided guidance to the states on the definition of a TMDL, defining it as addressing both point and nonpoint sources of pollution.
Oct. 1985	EPA described its responsibilities to set the TMDLs when it does not approve the state's submission.
Dec. 12, 1986	Northwest Environmental Defense Center (Portland, Oreg.) filed suit against EPA for failing to establish and maintain TMDLs on Oregon's water-quality-limited segments. The lawsuit specifically identified the Tualatin River as not meeting water quality standards.
Jan. 6, 1987	Northwest Environmental Defense Center filed an "intent to sue" against EPA, naming 27 other Oregon water bodies requiring TMDLs.
June 3, 1987	Consent decree entered into in which the state of Oregon has lead responsibility for designating water-quality-limited segments and promulgating TMDLs. If the state of Oregon fails to follow the schedule calling for identifying load capacity and setting TMDLs on at least two rivers a year, EPA is required to do so.
Oct. 7, 1988	EPA Region X approved the Tualatin River ammonia and Garrison Lake phosphorus TMDLs established by Oregon.

Some TMDL Requirements Can Be Difficult to Implement

Establishing TMDLs for a water-quality-limited segment can be an easy or difficult process. According to an EPA official, it is fairly easy to set TMDLs in one-half of the cases, especially where water quality standards are not met because one source is discharging one pollutant. However, the TMDL process can be very difficult to implement when multiple dischargers and/or pollutants impair the water quality of a particular water body.

The Oregon Department of Environmental Quality has spent over a year working on developing a TMDL on the Tualatin River. This process involves studying the water quality problems, evaluating and monitoring the river, and considering various point and nonpoint source control alternatives. The Program Manager of Washington State's Water Quality Program told us that the TMDL effort for the Spokane River has taken years. The coordination of all the local governments has been difficult, because the various groups tend to put off cooperation until faced with a clear cut time deadline, according to this official.

EPA Has No Way of Assessing TMDL Implementation Nationwide

Another factor that has contributed to the absence of TMDL implementation is that EPA does not tract nationwide the development and implementation of TMDLs on individual water-quality-limited segments or their effectiveness in meeting state water quality standards. EPA is developing a new system to track how states are implementing the new requirements of the Water Quality Act of 1987. However, this system will not track whether TMDLs are being set on individual water-quality-limited segments.

EPA's Current Systems Do Not Measure TMDL Compliance

According to EPA officials, as of August 1988, EPA did not have a nationwide comprehensive list of water-quality-limited segments. They said EPA did not place a high priority on getting the states to set TMDLs prior to 1985. Following the 1984 Scott case, however, EPA initiated some tracking requirements under its Office of Water Accountability System and Strategic Planning and Management Systems. EPA provided us with information from the Strategic Planning and Management System identifying that its regions approved water-quality-based controls for 626 bodies of water nationwide in fiscal year 1987. However, this information does not identify whether the controls were based on TMDLs and what controls were approved, i.e., more stringent controls on point sources, or other measures. Also, the information did not relate to a specific water-quality-limited segment and, as a result, this system does not measure how effective these controls have been in cleaning up water-quality-limited segments. Internal controls are needed to provide reasonable assurance that TMDLs are being set on water-quality-limited segments.[2]

[2]Internal controls that federal agencies are required to follow are set forth in GAO's Standards for Internal Controls in the Federal Government, published in 1983 pursuant to the Federal Manager's Financial Integrity Act of 1982.

EPA's Planned Management Systems Also Will Not Measure TMDL Compliance

According to the EPA Deputy Director, Monitoring and Data Support Division, EPA is developing a Water Body Tracking System that will identify bodies of water that are water-quality-limited and will track some TMDL requirements. According to EPA's Deputy Director, in April 1988, EPA began to use the states' 1988 biennial reports on water quality assessment and program plans to develop lists identifying waters impaired owing to point, nonpoint, and toxic pollutants.

According to this official, while these data will provide EPA management with a list of water-quality-limited segments, information will not be collected to track whether TMDLs are being developed on these water-quality-limited segments, or whether TMDLs that have been implemented are effectively working to ensure that water quality standards are met.

The Deputy Director also stated that in October 1988, EPA will start tracking the total number of TMDLs developed in each region through the Office of Water Accountability System. He said that each region will have a target for establishing TMDLs and information will be collected to identify how many TMDLs are developed against this target. However, he also said that this information will not identify whether TMDLs are developed on specific water-quality-limited segments.

As a result, neither EPA's new Water Body Tracking System nor its Office of Water Accountability System will enable users to determine whether TMDLs are being developed for specific water-quality-limited segments, or if TMDLs were developed, whether they are working to ensure that water quality standards are met. When we discussed this issue with EPA officials in September 1988, they said they did not realize that their systems would not track individual TMDL development and implementation and that they would consider adding this capacity to the Water Body Tracking System.

EPA recognizes that it has a problem in tracking programs to evaluate program effectiveness. A September 1987 joint EPA Office of Water and Office of Policy, Planning and Evaluation draft report entitled Surface Water Monitoring: A Framework for Change cited the need for accountability systems to identify the effectiveness of programs. EPA's report noted that it is unable to assess the effectiveness of point source control and nonpoint source management actions in terms of environmental results. The draft report recommended that EPA expand efforts to improve information on national progress in water pollution control. EPA's goal is to increase the number of waters assessed and to monitor

the effectiveness of pollution control actions taken toward waters that do not meet the state water quality standards.

In response to the draft report's recommendations, EPA is developing the Water Body Tracking System discussed previously. In addition, EPA plans to initiate in fiscal year 1989 a study effort to develop environmental indicators that may be used to track the results of pollution control actions.

Problems in Reporting TMDL Implementation

EPA regional office officials told us that reporting problems exist with the current tracking system because of the question of whether water-quality-based permits[3] are the same as TMDLs. The problem of whether water-quality-based permits are the same as TMDLs and whether they should be reported as such is best illustrated by EPA Region II. Although Region II officials said that only 4 TMDLs have been developed, they also reported approval of 53 water-quality-based permits to EPA headquarters in fiscal years 1987 and 1988. According to EPA Region II officials, these 53 permits have been counted on EPA's tracking system as TMDLs.

According to EPA Regions II and X officials, water-quality-based permits are not as comprehensive as TMDLs. For example, EPA's Region X Chief, Water Permits Section, said that water-quality-based permits are directly related to point source dischargers. He said that every permittee is looked at individually to determine if its discharges are causing a violation of water quality standards at the edge of the mixing zone (in the case of the Tualatin River's point sources, the mixing zone is the area 100 feet in diameter from the point of discharge). In addition, he said that the evaluation for writing a water-quality-based permit does not include an assessment of other permittees on the river nor does it generally include an assessment of nonpoint sources which can also affect the water quality of a limited segment.

Consequently, the water-quality-based permit does not focus on all the point and nonpoint contributions which are part of a TMDL for the entire water-quality-limited segment. EPA's regulations require that TMDLs identify both point and nonpoint pollution sources.

EPA recognized that regions are inconsistently reporting TMDLs and in May 1988 established a Task Group to address TMDL issues. The Task

[3]A water-quality-based permit is based on the discharge limits needed to produce a level of water quality that will help the receiving water meet water quality standards.

Group objectives are to clarify the definitions of TMDLs and waste load allocations and how they are to be applied and tracked by EPA.

Need to Better Integrate TMDL-Setting With New Water Quality Legislation

The Water Quality Act of 1987 reemphasizes the basic approach used in the Clean Water Act of 1972 to identify waters not meeting water quality standards and to develop and implement additional pollution controls to restore such waters to standards. It also accelerates state action to control toxic point source discharges and requires states to control nonpoint sources of pollutants under certain circumstances.

However, while EPA has asked the states to integrate information on the two new water quality programs in a periodic report to the Congress on national water quality, TMDL information required to be provided to the Congress from time to time has not been required by EPA in that report. In addition, because the new programs carry legislative compliance deadlines, some states, citing limited resources, plan to focus their efforts on implementing the new initiatives and have no plans to develop TMDLs in the near future.

New Requirements to Control Toxic Point and Nonpoint Pollution Sources

New Section 304(l) requires that states provide a list of all waters impaired (or threatened) by both point and/or nonpoint source discharges of toxic, conventional, and nonpoint pollutants. This list, due to EPA February 4, 1989, is virtually the same as the 303(d) list.

Section 304(l) also requires the states to identify waters that are not expected to meet water quality standards after technology-based controls have been implemented owing entirely or substantially to point source discharges of toxic pollutants. The Water Quality Act also requires the development of control strategies for these segments. For each segment, the states must determine the specific point source and the amount of each toxic pollutant discharged, and identify individual control strategies (i.e., discharge permits and support documentation) by February 4, 1989. These individual control strategies are designed to ensure that applicable water quality standards are achieved on such waters no later than June 1992. The effect of this provision is to focus national attention immediately on addressing known water quality problems due to point source discharges of toxic pollutants.

The Water Quality Act also focused on the importance of controlling nonpoint sources of pollution. The act states that it is national policy that programs to control nonpoint sources of pollution be developed in

an expeditious manner so as to enable the goals of the act to be achieved through the control of both point and nonpoint sources. New section 319 requires the states to prepare a list of waters that cannot reasonably be expected to attain or maintain water quality standards or the goals of the act without additional actions to control nonpoint pollution sources. States were required to submit a report by August 4, 1988, describing the nonpoint source problems and a state management program explaining what the state plans to do in the next 4 fiscal years to address these nonpoint source problems.

EPA's guidance implementing section 304(l) requirements states that TMDLs should be included in the support documentation for individual control strategies. However, EPA's guidance implementing the nonpoint source requirements does not mention TMDL setting. An EPA official said that while the guidance does not mention TMDLs, the existing requirement to set TMDLs under section 303(d) applies to all water-quality-limited segments including those listed under section 319.

TMDLs Not Integrated Into Reporting Requirements

EPA asked the states to integrate the new Water Quality Act requirements with their 1988 section 305(b) reports. However, the states are not required to report TMDL information in the 305(b) report. According to a Region X official, only Oregon's draft 1988 305(b) report included information on TMDLs.

Section 305(b) requires each state to submit a biennial report to EPA describing the quality of its navigable waters. EPA is required to transmit the state reports to the Congress (the National Water Quality Inventory), along with an analysis of these reports describing the quality of the nation's waters. EPA is using the 305(b) process as the primary vehicle for reporting on the new water quality measures required by the Water Quality Act. The Clean Water Act also requires the states to report TMDL information from time to time, but the reporting of TMDL information has not been integrated in the 305(b) report or any other EPA report to the Congress.

EPA's 1986 National Water Quality Inventory noted that the states reported that designated uses were found to be supported in most of the waters assessed, including 74 percent of assessed river miles. Nonpoint sources were reported to be the leading cause of failure to support uses in the nation's streams. According to the report, 65 percent of impaired stream miles are affected by nonpoint sources. The report also states that even though point sources continued to contribute to pollution,

nonpoint sources appear to be increasingly important causes of the remaining pollution.

Some States Do Not Plan to Set TMDLs

Three EPA Region X states are placing a higher priority on completing the new section 304(l) and 319 requirements than fulfilling the 303(d) requirements. State officials told us that they do not have the resources to comply with all the federal requirements, and as a result, they will focus their efforts on developing the sections 304(l) and 319 lists, reports, and control measures. With the exception of the Spokane River in Washington, these states do not plan to set any TMDLs for at least several years.

However, Oregon is working to address all of the requirements. According to the Oregon Department of Environmental Quality's Water Quality Planning Section Manager, Oregon must address the section 303(d) requirement and develop TMDLs on the bodies of water named in the consent decree by 1993. In addition, it is working on the lists required to address sections 304(l) and 319. According to this official, it is difficult to meet all these requirements with limited resources, but they are attempting to comply with all the requirements.

Cost Savings Expected From Setting a TMDL on One Body of Water

EPA cites the Dillon Reservoir near Denver, Colorado, as a good example that demonstrates the potential effectiveness and cost-saving possibilities of comprehensively setting maximum pollution limits. Through its Office of Program Planning and Evaluation, EPA funded a special study to evaluate the comparative cost of low-technology nonpoint source controls versus extremely advanced sewage treatment facilities discharging into the Dillon Reservoir.

The Dillon Reservoir is located 70 miles west of Denver in Summit County, Colorado, a county that experienced high population growth during the 1970s. The reservoir was constructed 20 years ago to serve as one of Denver's primary drinking water supplies. Since that time, it has become a popular recreation area. The population growth and extensive land use changes in the basin have increased nutrient loadings in the basin to the point that, combined with high natural background loadings, the resulting increase in phosphorus caused algal blooms and diminished oxygen levels in the reservoir during the summer months of 1982. As a result, the Northwest Colorado Council of Governments asked EPA to help fund and evaluate a pilot control facility at Dillon. The pilot demonstration compared the costs associated with controlling both

point and nonpoint sources of pollution and showed that nonpoint source urban runoff could be controlled at a considerably lower overall cost than available point source sewage treatment plant improvements. Phosphorus could be removed for $119 a pound through nonpoint source controls versus a range of $824 to $7,861 for each pound of phosphorus removed by point sources.

On the basis of the results of the study, the affected local governments worked together to set overall phosphorus limits and develop an overall pollution-trading approach which was approved by EPA. The major elements of this approach are as follows:

- The 1982 levels of phosphorus were set as the water quality target for Dillon. Each municipal sewage treatment plant was given a share of the available load, providing a "growth margin" through 1990.
- In addition to installing state-of-the-art phosphorus controls for point source sewage treatment plants, all new developments were required to contribute money to a Nonpoint Source Facilities Investment Fund, which will be used to construct controls for certain nonpoint sources and help finance administration of the trading program.
- A "trading ratio" of 2:1 was established to ensure environmental progress. This means that for each pound of phosphorus a treatment plant is allowed to discharge above 1982 levels, 2 pounds of phosphorus must be removed from a nonpoint source existing before 1984.
- Both point and nonpoint dischargers receive Clean Water Act permits which define their phosphorus limits and their responsibilities for maintaining nonpoint source control devices. Failure to operate and maintain the devices will result in direct federal or state enforcement action.
- The Summit County Water Quality Committee was established to monitor the trading program and provide long-term water quality management.

The Director of EPA's Regulatory Innovations staff worked on the basic study project. He stated that the trading approach is more than just cost efficient, it can also be more environmentally effective. He explained that environmental goals for water are ultimately concerned with ambient water quality. He added that for purposes of determining acceptable maximum pollutant loadings, such as TMDLs, point sources can be considered together with nonpoint sources within a watershed management strategy, instead of focusing on point sources in isolation, which is the more traditional approach.

According to an article in the October 1985 EPA Journal, control of nonpoint sources at Dillon was necessary to avoid a sewer tap moratorium, which would effectively freeze growth and severely restrict Summit County's strong economy. The article summarizes the benefits of the point and nonpoint source pollution control trading recommended for the Dillon Reservoir by reporting that trading offers potential control of nutrient pollution on all such bodies of water, in ways which are nonintrusive, save tax dollars, and allow regulatory programs to operate more smoothly.

As of September 9, 1988, total maximum loadings had been established, but the nonpoint source trading approach had not yet been used at Dillon. An EPA Region VIII official explained that the Dillon area experienced 2 years of greater runoff than expected, which has diluted pollution to the extent that local governments have not had to use nonpoint source offset techniques. It is anticipated that this year will be a more normal water runoff year and local groups are looking closely at sites where they may treat nonpoint pollution sources, the official stated.

EPA Region X and state officials commented that examples of TMDL setting, such as Dillon, would be helpful. Officials from three states said such information seemed useful in demonstrating techniques and the potential benefits of nonpoint source trading. Information about Dillon had not been provided to these states nor had information on other such cases.

The Chief of EPA's headquarters Monitoring Branch, Office of Water Regulations and Standards, agreed that it is a good idea to conduct pilot and demonstration projects with different EPA regions to show the regions and states how it is done. He said he would like to do this, but does not have the resources.

Conclusions

The development and implementation of TMDLs for bodies of water on which technology-based standards are not stringent enough to achieve state water quality standards provides a comprehensive approach to identifying and resolving water pollution problems regardless of the sources of pollution. If implemented, the TMDL process can provide EPA and the states with a complete listing of key water pollutants, the source of the pollutants, information on the amount of pollutants that need to be reduced, options between point and/or nonpoint approaches, costs to

clean up, and situations where it may not be feasible to meet water quality standards. However, 16 years since the Clean Water Act was enacted, EPA and the states have not developed TMDLs for many of the nation's most polluted waters.

Among the reasons for the limited development and implementation of TMDLs has been the relative low priority they have received from EPA. Since 1972, EPA has been concentrating on other priorities such as controlling pollution through the funding and/or permitting of municipal and industrial treatment plants. EPA has reported success with this approach, but about 25 percent of assessed waters are still not fully meeting water quality standards.

EPA began focusing on implementing the TMDL legislative requirements when compelled by court actions. It was not until 1985, following two lawsuits, that EPA put in place basic program concepts such as roles and responsibilities and a definition of TMDLs. The 1986 Oregon lawsuit also compelled EPA and Oregon to begin carrying out the act's requirements in that state.

Another factor contributing to the limited development of TMDLs has been that EPA does not have management controls to track development and implementation of TMDLs or identify TMDL effectiveness. As a result, EPA does not know whether the states are fulfilling the Clean Water Act's TMDL requirements, or whether EPA needs to fulfill its responsibilities to establish TMDLs when the states do not do so.

The Water Quality Act of 1987 provides EPA and the states an opportunity to implement the new water quality provisions in conjunction with the TMDL process required by the previously enacted Clean Water Act. However, EPA's guidance on integrating the 1987 water quality programs with the ongoing programs does not integrate the TMDL process with water quality reporting required under section 305(b). In addition, some states have indicated that they do not intend to implement any TMDLs on water-quality-limited segments beyond their existing plans. Rather, these states have cited a preference to use limited funds to emphasize implementation of the new water quality initiatives. Consequently, while states are in the process of implementing the new initiatives, they do not plan to set TMDLs for water-quality-limited segments identified under these provisions.

We recognize that the additional initiatives imposed by the Water Quality Act of 1987 increase the burden on the already limited resources that

EPA and the states have to control water pollution. However, the Dillon Reservoir illustrates that TMDL-setting has the potential to identify more effective and cost-efficient cleanup alternatives—attributes made all the more important in view of the limited funding cited by EPA and these states—and allow economic growth to occur. Therefore, delaying implementation of TMDL-setting, based on budget limitations, carries with it a "cost" of its own. Furthermore, TMDL-setting assures that both point and nonpoint sources of pollution are considered when states clean up their water-quality-limited segments, which is particularly important since nonpoint pollution sources are a leading cause of water-quality-limited segments.

Recommendations to the Administrator, EPA

We recognize that states and EPA must set priorities when faced with limited budgets and increased water pollution control responsibilities. To give a greater sense of direction to implementing the Clean Water Act's TMDL requirements within these constraints, we recommend that the Administrator of EPA:

- Work with the states to set time frames, recognizing the priorities imposed by the Water Quality Act of 1987 requirements and budget resources, for developing total maximum daily loads on their water-quality-limited segments. For those states that do not set or meet their TMDL time frames, set time frames for EPA regions to begin developing TMDLs.
- Require that EPA's planned Water Body Tracking System incorporate information on the requirements of section 303(d) to ensure that TMDLs are developed and actions taken to clean up waters that are still below the standards. The system should include, for example, information on waters which have been designated as water-quality-limited, whether TMDLs have been set, the time frames for developing TMDLs, and whether water quality standards have been met after implementing TMDLs.
- Include in the National Water Quality Inventory information on the development, implementation, and effectiveness of TMDLs in meeting state water quality standards for water-quality-limited segments. Using this information, EPA can then report to the Congress on the status of actions to ensure that our nation's waters are cleaned up.
- Provide case study examples, such as the Dillon Reservoir, to EPA regions and the states to assist them in developing TMDLs and evaluating trade-off strategies for implementing TMDLs.

BLANK PAGE

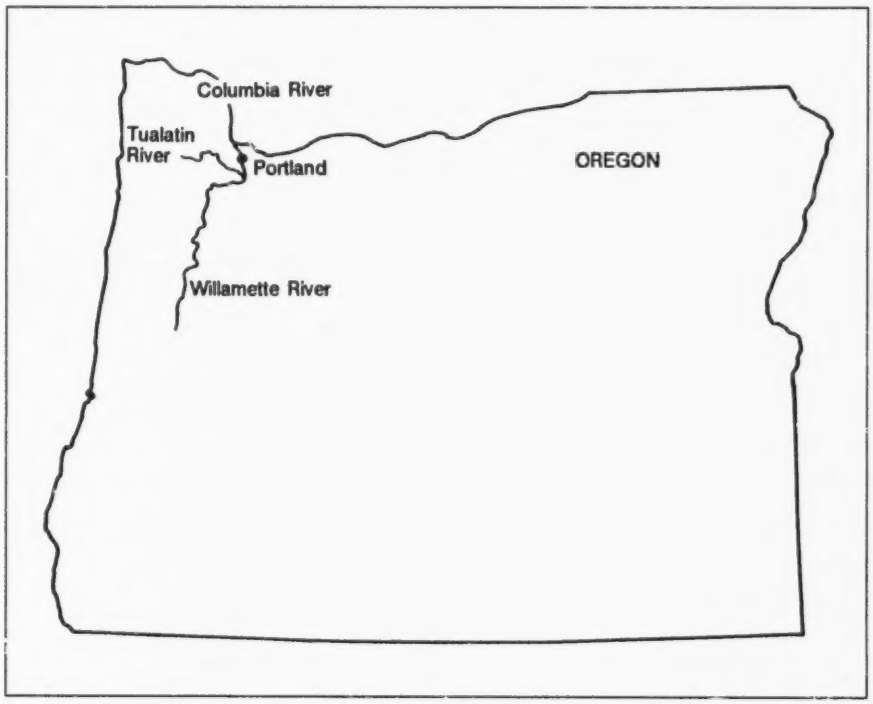
Oregon's Development of TMDLs on the Tualatin River

As a result of a consent decree, Oregon's Department of Environmental Quality (the Department) initiated action to develop total maximum daily loads on 11 bodies of water. The manager of the Water Quality Planning Section of the Department stated that these bodies of water in total or in part do not meet the state's water quality standards. The Tualatin River was Oregon's first body of water on which a TMDL was developed, and the process established will be the prototype for TMDL development on the other state water-quality-limited segments.

Background

The Tualatin River Basin, located in northwestern Oregon near Portland, consists of a central plain surrounded by hills and mountains. The Tualatin lies primarily in Washington County and is an important natural resource for drinking water, irrigation, industry, and recreation. Figure I.1 shows the location of the Tualatin River in Oregon. The Tualatin is a slow-moving river which drains lands with diverse uses, including developing urban areas and agricultural areas. The basin has experienced relatively high population growth over the past 3 decades, increasing from about 60,000 in 1950 to nearly 270,000 today. Population is projected to reach 350,000 by the year 2000.

Figure I.1: Location of Tualatin River



Tualatin River Water Quality Issues and Actions

The Tualatin Basin has been affected for over a decade by large sewage inputs from growing population and the sluggishness of the river. As a result, water quality in the river has been substandard for years. According to the Department, the major problems are phosphorus-enduced algal blooms, which have caused the river to be unsightly, and low levels of dissolved oxygen, caused by ammonia, which decreases the fish population. Several actions have been taken to clean up the river. These actions range from building new sewage treatment plants, to building a dam, to developing TMDLs to correct water quality standards violations.

Federal Funds Spent on Sewage Treatment Plant Construction

Rapid population growth created an overload of wastewater in the Tualatin during the 1950s and 1960s. In the 1970s, many small, overloaded, inefficient and outdated sewage treatment plants were closed for public health reasons. These plants began transferring their waste into the Unified Sewerage Agency's (the Agency) Durham and Rock Creek wastewater treatment facilities, which discharge into the Tualatin year

round. Four other Agency plants also discharge into the Tualatin or its tributaries, from November through April. In March 1988, an Agency official said that since the formation of the Agency in 1970, EPA has provided the Agency approximately $52 million for constructing/upgrading facilities through EPA's construction grants program. The official also said that local funding of about $56 million has also been spent on basin facilities. Of these funds, between $2.3 million and $3.4 million has been spent on phosphorus reduction. A local official said the Rock Creek sewage treatment plant currently removes about 75 percent of the phosphorus from its discharges.

Federal Funds Spent on Scoggins Dam

The federal government has also spent about $63 million on a water storage reservoir on Scoggins Creek.[1] The Tualatin River's water quality was affected by low flows and sluggishness caused by a lack of slope. The Tualatin drops only 12 inches in elevation in 23 miles of flow. Prior to the construction of the Scoggins Dam, the Tualatin had run almost completely dry in some summers. The low water levels led to warm temperatures, low oxygen, and an inadequate water supply for fish, irrigation, and/or sewage dilution. In 1972, the U.S. Bureau of Reclamation began constructing a multipurpose water resources project. The project provides water to supplement the natural stream flow of the Tualatin. The acting Northwest Regional Director of the Bureau of Reclamation estimated that about $4 million of the dam and pumping facilities' cost was associated with water quality.

Proposed TMDLs to Clean Up the River

According to an EPA Region X official, even though the major sewage treatment plants on the Tualatin have been built and have exceeded the technology-based requirements of secondary treatment, the Tualatin is still polluted. Water quality standards for dissolved oxygen and nuisance algal growth are being violated. In December 1986 the Northwest Environmental Defense Center sued EPA for failing to designate water-quality-limited segments and develop more stringent requirements to control the pollution. Since the lawsuit, the Oregon Department has classified the river as water-quality-limited, and studies were begun to identify controls needed to ensure river cleanup.

On July 8, 1988, the Department proposed two TMDLs on the Tualatin River to ensure that violations of existing water quality standards are

[1]One of the authorized purposes of this project is to provide flow augmentation for water quality in the Tualatin River.

addressed. The proposed TMDLs are on ammonia and phosphorus. The Department states that standard violations of dissolved oxygen and nuisance algal growth are occurring and are causing severe water quality problems. For example, ammonia robs the water of oxygen, killing the fish. Excess phosphorus encourages growth of algae, which gives the river a bright green color and causes unsightly floating mats of algal blooms.

The Department noted that the sewage treatment plants introduce nearly all of the ammonia in the Tualatin River. However, phosphorus does not come from a single source. A departmental study found that the sewage treatment plants add most of the phosphorus in summer (about 85 percent), when algae thrives. In winter, the majority of phosphorus comes from runoff from urban and agricultural areas during heavy rains. The river flushes out winter phosphorus, but Lake Oswego, which draws water from the river in spring, traps this phosphorus, making it available to encourage algal growth in the summer.

On the basis of such studies, as well as public and technical input, the Department proposed TMDLs on phosphorus and ammonia. The maximum amount of phosphorus proposed for the Tualatin River between river mile 39 and zero is 0.07 milligrams per liter of water in the river. This phosphorus limit will be enforced for only part of the year, from May 1 to October 31, because the water quality problems only occur in the warmer months. The maximum amount of ammonia proposed is 1.0 milligrams per liter of water in the river. The enforcement period for the ammonia TMDL is May 1 to November 15.

The Oregon Environmental Quality Commission (the state agency which establishes policies to implement Oregon's pollution control programs) adopted rules that set criteria for both TMDLs on July 8, 1988, and the Department plans to include them in Oregon's special policies and guidelines section of the Oregon Administrative Rules, which establishes the state's water quality standards. Following a public notice requesting comments about schedules for implementing the TMDLs, EPA noted that Oregon had made significant progress toward setting the TMDLs. However, EPA also noted that the individual waste load allocations and load allocations must be defined before the TMDLs are completed.

On September 22, 1988, the Department submitted to EPA's Region X the TMDL and waste load and load allocations for ammonia on the Tualatin River and phosphorus on Garrison Lake. Region X approved these submissions on October 7, 1988. Oregon officials said they plan to submit

the TMDL and waste load and load allocations for phosphorus on the Tualatin River by the end of the year. The officials said that the TMDLs must ensure that the existing water quality standards are met by June 30, 1993.

Local Government Concerns About TMDLs

Local government officials told us that they were concerned about the effectiveness of the proposed TMDL on phosphorus and whether it can be achieved. Concerns have been raised only on the proposed phosphorus TMDL, not on the TMDL on ammonia. According to the Unified Sewerage Agency General Manager, the TMDL on ammonia will be implemented in November 1989, as the Agency is already building facilities at the Rock Creek Waste Treatment Plant to reduce ammonia loads.

Phosphorus TMDL May Be Too Expensive

According to the Unified Sewerage Agency General Manager, the cost to implement the phosphorus TMDL may be prohibitive. Although all alternatives have not been identified, he stated that preliminary cost analysis includes options such as carrying the effluent of the Durham plant in pipes to the Willamette River, carrying the effluent discharge of the Rock Creek plant in pipes to the Columbia River, developing wetlands for recycling the discharge, and reusing effluent discharges for irrigation purposes. The General Manager noted that a combination of these and/or other alternatives would probably be investigated. The preliminary data on the costs to implement these options range from $50 million to $150 million.

Unified Sewerage Agency officials indicated frustration with the lack of information on the need to develop TMDLs and costs to implement the phosphorus TMDL. They told us that Washington County had gone through a similar exercise in the past and if they had known about the TMDL requirements, they probably would not have located their sewage treatment plants in the current locations. Analysis of the construction of the existing sewage treatment plants did include discussion on location, and the Agency had proposed building the plant on the banks of the Willamette River. However, he said the application was denied. Now, the Agency may be forced to pipe discharge out of the basin, at an expense of millions of additional dollars.

Phosphorus TMDL May Take Years to Clean Up the River

Questions have been raised about whether the TMDL can be achieved in the 5-year time frame. According to the Unified Sewerage Agency General Manager, a consultant determined that the technology does not exist to meet the TMDL phosphorus loading allocation within the time frame. He noted that the Rock Creek Sewage Treatment Plant is already at 75-percent reduction of phosphorus, with effluent limits of between 250 to 300 pounds of phosphorus a day. He said the proposed TMDL allocation for the plant would cause the plant to decrease the phosphorus from between 250 and 300 to approximately 20 pounds a day. The General Manager said that it will take 15 to 20 years to achieve the TMDL allocation.

Phosphorus TMDL May Not Be Effective

Concerns have been raised on the effectiveness of the phosphorus TMDL to achieve state water quality standards. According to the Chairperson, Washington County Board of Commissioners, the Department's data on the phosphorus TMDL does not quantify the effectiveness of setting the TMDL. Further, she noted that unless the effectiveness is quantified, it is likely that millions of dollars will be spent on cleaning up a visibility problem (the algal growth turns the river green and produces floating algal blooms) without substantially ensuring that water quality is improved.

Nonpoint Sources Still Need to Be Controlled

Another area of concern is how the nonpoint source allocations will be implemented. Currently, the Department has noted that nonpoint source pollution must be controlled in order for water quality standards to be achieved. In the July 8, 1988, report to the Environmental Quality Commission on the proposed TMDLs, the director stated that data show that the Tualatin and its tributaries are adversely affected by nonpoint source pollution discharges such as urban storm water runoff and agricultural discharges. The Department plans to hold Washington County and the adjoining county of Clackamas responsible for developing plans within specific time frames for controlling urban runoff. Also, a lead agency still needs to be designated for agricultural nonpoint sources. According to the Chairperson, Washington County Board of Commissioners, implementing an effective nonpoint source program will take a lot of coordination and expertise.

Oregon Department of Environmental Quality Response

According to the Oregon Department of Environmental Quality's Water Quality Planning Section Manager, the concerns expressed by local government officials are being addressed. In response to the Unified Sewerage Agency's concerns about the costs and deadlines for implementing the phosphorus TMDL, the manager said that the Commission's proposed TMDL requires the Unified Sewerage Agency to submit a plan describing the costs and time frames for each of the alternatives available to implement its proposed waste load allocation. He said the Commission will consider the cost and deadline issues for implementing the TMDL, based on the Agency's plan, public hearings, and other appropriate information before completing the TMDL at the end of the year.

Regarding the concern that it is difficult to quantify the effectiveness of the phosphorus TMDL, according to the manager, the Department has determined that the TMDL and waste load and load allocations will ensure that the state water quality standard is met.

The manager also said that the Commission is addressing the concerns about how nonpoint sources of pollution will be controlled. He said the Commission is requiring Washington, Clackamas, and Multnomah counties, all the incorporated cities in the Tualatin River and Lake Oswego subbasins, and the Oregon Departments of Agriculture and Forest Service, to submit plans for controlling nonpoint sources by March 1990. He added that the Department will be providing guidance to the communities and agencies on what should be included in the plans.

Oregon's Development of TMDLs on the South Umpqua River

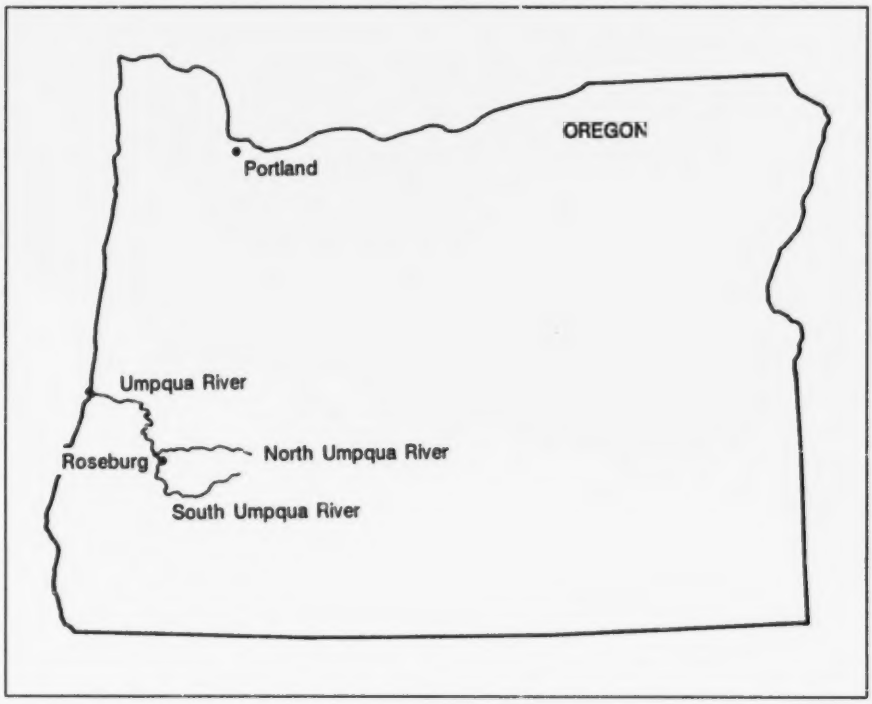
Oregon's Department of Environmental Quality (the Department) plans to develop TMDLs on 11 bodies of water in the state. The South Umpqua River was identified as one of the most polluted bodies of water needing TMDL development.

Background

The South Umpqua River, located in Douglas County, Oregon, flows 114 miles from its headwaters in the Oregon Cascade Range to where it converges with the North Umpqua River near the City of Roseburg to become the Umpqua River. The South Umpqua subbasin includes a drainage area of 1,760 square miles and encompasses most of south Douglas County. Figure II.1 shows the location of the South Umpqua River in Oregon. Important land uses in the basin are forestry and agriculture. Timber provides the region's main livelihood, with approximately 25 to 30 percent of the Douglas County labor force employed in the forest products industry. About 49 percent of the subbasin contains lands owned or managed by the federal government.

The South Umpqua River subbasin has a population of about 65,000. About 70 percent of the Douglas County residents reside in the basin area; the City of Roseburg has the largest population (23,000). The Roseburg population is expected to increase to 45,000 by the year 2000.

Figure II.1: Location of South Umpqua River



South Umpqua River Water Quality Issues and Actions

The South Umpqua River has been affected by water quality issues within the last decade. Water quality problems of low flow, high temperature, algal growth, and sporadic high levels of bacteria from animal wastes have affected recreational use and aquatic life in the South Umpqua. An Oregon Department of Fish and Wildlife representative said that low flows have resulted in insufficient water for fish to make it upstream. He added that high temperatures, as well as algal growth have reduced the oxygen levels which subsequently, can kill the fish. Also, because of occasional high levels of animal waste, an Oregon Department of Water Resources official stated that the river has been closed to swimming during the summer. As a result of these pollution problems, several actions have taken place to improve the river's water quality. These actions range from building sewage treatment plants, to building a dam, to initiating actions on TMDLs to correct water quality standards violations.

Federal Funds Spent on Sewage Treatment Plant Construction

The federal government, through EPA's construction grants program, has spent about $22 million to construct municipal sewage treatment facilities in the South Umpqua River subbasin. Seventeen projects in the subbasin have received federal grants.

In the early 1980s, two facilities were identified as causing water quality problems in the South Umpqua River below Roseburg. Both facilities were older and could not effectively handle the sewage. As a result of studies to address the problem, in 1983 the Roseburg Urban Sanitary Authority (the Authority) was formed. In 1984, the Authority applied for and received federal grants (about $9 million) to construct a regional sewage treatment plant at Roseburg to replace the two older plants. The new combined plant became operational in late 1986, and has now been identified as being a major point source of phosphorus pollution to the South Umpqua River.

Federal Funds Spent on Galesville Dam

The federal government has spent about $35 million on the Galesville Dam, which was completed in 1986. This dam was constructed under the U.S. Bureau of Reclamation's loan program. Douglas County's contribution was about 28 percent of the project. The dam improves the water flow, since the South Umpqua generally has low summer water flows, for such dam benefits as irrigation; flood control; hydro-electric power; and recreation, fishing, and wildlife. The increased water flows help improve water quality, but this was not listed as a dam benefit.

Proposed TMDLs to Clean Up the River

The South Umpqua River is violating water quality standards. As a result, in December 1986 the Northwest Environmental Defense Center sued EPA for its failure to designate water-quality-limited segments in Oregon and develop more stringent requirements to control the pollution. Since the lawsuit, the Department has classified the South Umpqua River as water-quality-limited, and studies have begun to identify controls to ensure that the river is cleaned up.

On November 12, 1987, the Department issued a public notice proposing to set TMDLs for phosphorus and ammonia in the South Umpqua. The South Umpqua River currently violates the water quality standards for dissolved oxygen and pH (a measure of the acidity or alkalinity of a solution, with the higher range being alkalinity). According to the Department, dissolved oxygen is essential for maintaining aquatic life and should be at a range of 7 to 8 milligrams per liter, depending on the

water temperature. The South Umpqua dissolved oxygen daily measurements range from 8 to 15.2 milligrams per liter. Violations are also occurring for pH. According to the standards, measurement should not exceed the range of 6.5 to 8.5. The pH for the South Umpqua below Roseburg has exceeded 8.5 during critical conditions in the summer months.

Departmental officials noted that both the dissolved oxygen and pH problems appear to be the result of high algal growth. They stated that studies indicate that phosphorus is a major factor which stimulates algal growth. The Department believes that phosphorus is a critical parameter that directly affects the water quality problems in the South Umpqua subbasin.

In addition, the Department notes that excessive levels of ammonia have been shown to be toxic to fish and other aquatic life. According to a Department report dated October 1987, the South Umpqua River below Roseburg is currently not violating ammonia standards. However, to prevent anticipated ammonia toxicity problems, the Department has proposed a TMDL for ammonia.

The Department said in its problem assessment that 13 point sources discharge wastewater into the lower 75 miles of the South Umpqua. These dischargers include an industrial plant, two water treatment plants, three log ponds which overflow, and six sewage treatment plants. The Roseburg Urban Sanitary Authority's treatment plant is the largest point source discharge in the South Umpqua subbasin and discharges an estimated 70 percent of the sewage loadings in the river. This new facility has affected the water quality by its discharge of phosphorus, producing a loading of between 200 and 250 pounds per day, according to the Department's October 1987 report. In addition, the Department estimates that other sewage dischargers may add to the effects of the Authority's plant discharges and should be considered.

The Department indicated that agricultural nonpoint sources may not have a significant impact on phosphorus loadings in the South Umpqua. They reported that water quality standards violations are occurring in the summer months, and that agricultural lands are irrigated mainly by sprinkler systems, which generally produce little pollution runoff. Although nonpoint sources may not be a problem, they reported that all potential pollution sources, both point and nonpoint, must be evaluated before a control strategy will be recommended.

As a result of initial studies, the Department has proposed some preliminary limits on phosphorus and ammonia. The preliminary TMDL loadings are identified in a November 12, 1987, public notice. The proposed limits are from June through October, with the phosphorus loadings ranging from 20 to 150 pounds per day and the ammonia loadings ranging from 100 to 750 pounds per day, depending on the river's flow.

Future Actions to Develop TMDLs

The Department states that the development of TMDLs on the South Umpqua has been delayed. According to the Oregon Department of Environmental Quality's Water Quality Planning Section Manager, the Tualatin River is the first segment on which TMDLs will be developed in Oregon. The process by which the TMDLs are developed for the Tualatin will be the prototype for developing TMDLs on the other 10 rivers. The manager stated that the South Umpqua River TMDLs will be developed under the state's prioritization plan and as resources are available to undertake this effort. However, the consent decree required that the TMDL for the South Umpqua River be completed by June 1993.

Local Government Concerns About the Proposed TMDLs

Local government officials told us that they were concerned about the proposed TMDLs because of insufficient water quality planning, outdated information on which the preliminary limits were developed, and the need to assess and control nonpoint sources.

The Roseburg Urban Sanitary Authority Manager commented on insufficient water quality planning. He said that if the Department had developed the TMDLs before the plant was completed in 1986, savings would have occurred. For example, he noted that the plant could have been located at a different site, which would have allowed for greater dilution, and/or the plant could have been designed differently. He said that a facility could have been designed to remove phosphorus and ammonia. The Authority's cost estimates to reduce the phosphorus and ammonia are about $2.2 million for capital investment and about $190,000 per year for operating and maintenance expenses.

According to the Umpqua Regional Council of Governments' Executive Director, much of the data on which the preliminary TMDLs were based was not current and did not reflect the major improvements that will affect the river's water quality. Two major projects, the Galesville Dam and the Roseburg Urban Sanitary Authority's facility, were completed in 1986. He believes the increase in water supply and the more effective treatment of waste should improve the water quality. The manager of

the Authority also added that the Department does not have enough current information to conclude that controlling phosphorus will solve any problems.

Another concern was the need for nonpoint sources to be identified and controlled. The Chairman, Douglas County Soil and Water Conservation District, and the Executive Director of the Umpqua Regional Council of Governments, were concerned about the lack of studies to identify nonpoint source polluters and the contribution of nonpoint sources. For example, the river periodically has high levels of bacteria due to animal wastes. The officials said that nonpoint sources could be determined and should be controlled.

Oregon Department of Environmental Quality Response

According to the Oregon Department of Environmental Quality's Water Quality Planning Section Manager, the Department has been monitoring the South Umpqua River for many years and will continue to monitor its water quality. On the basis of their preliminary study, after the construction and operation of both the dam and new sewage treatment plant, the Department believes that TMDLs need to be set on phosphorus and ammonia. The manager noted that the Department will conduct more detailed studies on the South Umpqua River to set the TMDLs. He said that these studies will be conducted when resources are available. The consent decree requires that the studies be completed and the TMDLs set by June 1993.

Appendix III

Major Contributors to This Report

Resources, Community, and Economic Development Division, Washington, D.C.	Hugh J. Wessinger, Senior Associate Director, (202) 275-5489 Richard L. Hembra, Associate Director Robert S. Procaccini, Group Director Robert P. Cavanaugh, Assignment Manager
Seattle Regional Office	Charles D. Mosher, Evaluator-In-Charge Elizabeth J.L. Reid, Site Senior David W. Bogdon, Evaluator

*U.S. G.P.O. 1988-241-164:80360

Requests for copies of GAO reports should be sent to:

U.S. General Accounting Office
Post Office Box 6015
Gaithersburg, Maryland 20877

Telephone 202-275-6241

The first five copies of each report are free. Additional copies are $2.00 each.

There is a 25% discount on orders for 100 or more copies mailed to a single address.

Orders must be prepaid by cash or by check or money order made out to the Superintendent of Documents.